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UNDERSTANDING BREAST CHANGES

A Health Guide for All Women

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Public Health Service
National Institutes of Health

Dear Reader:

We are pleased that you have received a copy of this National Cancer Institute booklet. We hope you find it helpful.

We are always trying to improve our publications. The best way we can do this is by getting your reactions. At the end of this booklet you will find a response card asking several questions. We would greatly appreciate your taking the time to fill this out and return it to us.

All of your responses will be treated confidentially. We welcome any other comments you may have.

Thanks in advance,

Office of Cancer Communications

IAET 6723

UNDERSTANDING BREAST CHANGES

A Health Guide for All Women

Breast cancer is hard to ignore. It is the most common form of cancer among American women, and almost everyone knows at least one person—aunt, coworker, neighbor, childhood friend, sister-in-law—who has been treated for it.

Understandably, women are concerned about getting breast cancer, and this concern prompts them to watch for breast changes. Breast changes are common. Even though the great majority are benign, they can be worrisome.

This booklet is designed to help you with these concerns. It describes screening practices that will help you monitor the health of your breasts, explains the various types of breast changes that women experience, and outlines methods that doctors use to distinguish between benign changes and cancer. It reviews factors that can increase a woman's cancer risk and reports on current approaches to breast cancer prevention. Words that appear **bold** in the pages that follow are defined in the Glossary that begins on page 41.

We hope that you will find the information in this booklet helpful. Information is a powerful ally in maintaining good health.

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Breast Cancer: Status Report

This year in the United States an estimated 184,000 women will learn they have breast cancer. Three-fourths of the cases of breast cancer occur in women age 50 or older, but it affects younger women, too (and about 1,400 men a year).

More women are getting breast cancer, but no one yet knows all the reasons why. Some of the increase can be traced to better ways of recognizing **cancer** and greater efforts to detect cancers in an early stage. Some of it may be the result of changes in the way we live—postponing motherhood, taking replacement hormones and oral contraceptives, eating high-fat foods, or drinking more alcohol.

The encouraging news is that, more and more, breast cancer is being detected early, while the tumor is limited to the breast and very small. Currently, two-thirds of newly diagnosed breast cancers show no signs that the cancer has spread beyond the breast.

With prompt and appropriate treatment, the outlook for women with breast cancer is good. Moreover, a majority of women diagnosed with early stage breast cancer are candidates for breast-conserving treatment.

The Key: Early Detection

The key to finding breast cancer is early detection, and the key to early detection is **screening:** looking for cancer in women who have no symptoms of disease. The best available tool is regularly scheduled screening **mammography—x-rays** of the breast—coupled with **clinical breast examination** by a doctor or nurse.

Mammography

A mammogram is an x-ray of the breast. Cancers that are found on mammograms but that cannot be felt (**nonpalpable cancers**) are smaller than cancers that can be felt, and they are less likely to have spread.

On the other hand, mammography is not foolproof. Some breast changes, including lumps that can be felt, do not show up on a mammogram. Changes can be especially difficult to spot in the dense, glandular breasts of younger women. This is why women of all ages should have their breasts examined every year by a physician or trained health professional.

A lump should never be ignored just because it is not visible on a mammogram.

Two Kinds of Mammography: Screening and Diagnostic

A word of caution is in order. Mammography as discussed in this booklet pertains to screening: looking for breast changes in women who have no signs of breast disease. The situation is entirely different when a woman comes to her doctor with unusual breast changes

Major Factors Increasing Breast Cancer Risk

History of prior cancer in one breast
Age (+50)
Mother or sister with breast cancer history
A diagnosis of atypical hyperplasia*
Benign breast disease with hyperplasia
Early menses (before 12)
Delayed childbirth (after 30)
Delayed menopause (after 55)

*More important when family history is present

such as a lump, pain, nipple thickening or discharge, or changes in breast size or shape. In such circumstances, the doctor often asks the woman to have a **diagnostic mammogram**: an x-ray of the breast to help assess her symptoms. A diagnostic mammogram is a basic medical tool, and it is appropriate regardless of a woman's age.

Who Benefits From Screening Mammography

While there is little doubt that mammography plays a role in the detection of breast cancer for all women, what is less clear is the extent to which finding those cancers during screening will translate into saved lives for all age groups. Scientific studies performed over the past 30 years clearly show that regular screening mammography significantly reduces the death rate from breast cancer in women over the age of 50 (the approximate time of **menopause**). However, the evidence from these same studies is not as clear with regard to women younger than age 50.

In the absence of definitive data, there is no universal agreement on screening policy for younger women, with regard to either the age at which to begin or the frequency of subsequent mammograms. Several, but not all, national and professional organizations in the United States recommend that all women over the age of 40 should be screened at regular intervals. Others recommend that routine mammography begin at age 50.

A registered technologist places the breast between two plastic plates.

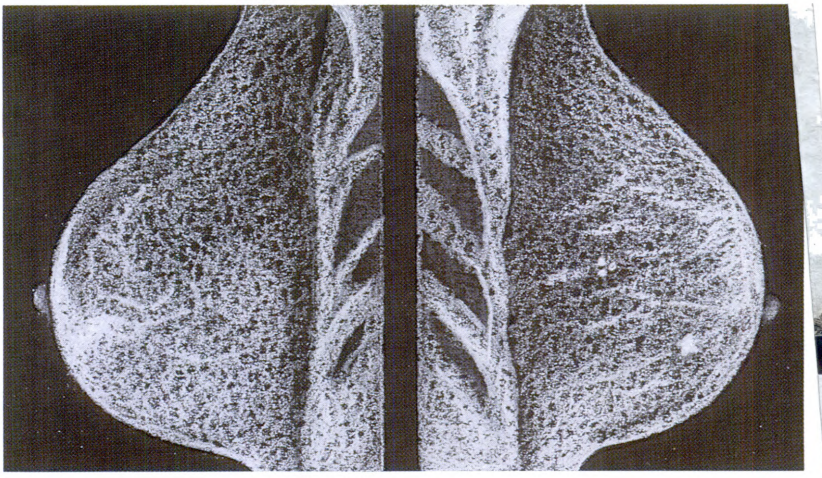
Ongoing research is attempting to arrive at some definitive answers. For the present, the decision of a woman in her forties to have a screening mammogram rests with her and her physician.

Mammography and Age

As a woman grows older, her breasts change. The breasts of a young woman contain many glands and ligaments, which appear dense on a mammogram. This "radiologic density" makes it more difficult to spot **tumors** or to tell cancers from noncancerous conditions, or requires a higher dose of **radiation** to do so. With age, the glandular and fibrous tissues of the breast gradually give way to fatty tissues. Because fatty tissue has less radiologic density, mammograms can more easily "see" into the breast tissue and detect abnormal changes.

How Mammograms Are Made

Mammography is a simple procedure. It utilizes a "dedicated" x-ray machine specifically designed for x-raying the breast (in contrast to machines used to take x-rays of the bones or other parts of the body). The standard screening exam includes two views of each breast, one from above and one angled from the side. A registered technologist positions the breast between two flat plastic plates. The two plates are then pressed together. The idea is to flatten the breast as much as possible; spreading the tissue out makes any



The diagnostic radiologist looks for unusual shadows, masses, distortions, and differences between the two breasts.

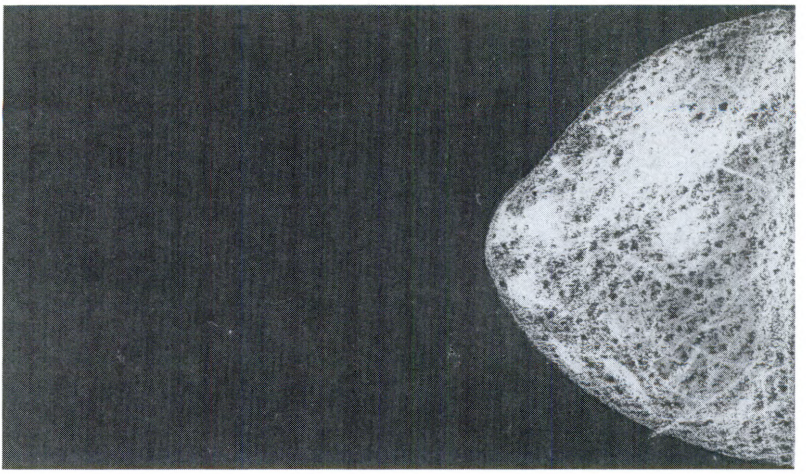
abnormal details easier to spot with a minimum of radiation. The technologist takes the x-ray, then repeats the procedure for the next view.

The pressure from the plates can be uncomfortable, or even somewhat painful. It helps to remember that each x-ray takes just a few moments—and that it could save your life. It also helps to schedule mammography just after your period, when your breasts are least likely to be tender.

Although some women are concerned about radiation exposure, the risk of any harm is extremely small. First of all, the doses of radiation used for mammography are very low. Specialized mammography facilities have experienced personnel as well as modern equipment that is custom-designed for mammograms. The combination of good technology and expertise makes it possible to obtain good quality x-ray images with very low doses of radiation.

Women should be further reassured to know that any effect of radiation on the breasts decreases sharply with age. Studies of women exposed to large doses of radiation in years past (for instance, in the course of treatment for tuberculosis) show that breast cancer developed more commonly only among those who had been young—often in their early teens—at the time they received the radiation.

The exact amount of radiation needed for a specific mammogram will depend on several factors. For instance, breasts that are large or dense will require higher doses to get a clear image.



Macrocalcifications are usually associated with benign breast conditions; many clusters of microcalcifications in one area may be an early sign of breast cancer.

Federal mammography guidelines limit the radiation used for two views of one breast to 1 rad. (A "**rad**" is a unit of measurement that stands for **r**adiation **a**bsorbed **d**ose.) In practice, most mammograms deliver just a small fraction of this amount.

Reading a Mammogram

The mammogram is first checked by the technologist and then read by a diagnostic radiologist, a doctor who specializes in interpreting x-rays. The **radiologist** looks for unusual shadows, masses, distortions, special patterns of tissue density, and differences between the two breasts. The shape of a mass can be important, too. A growth that is **benign** (noncancerous) such as a cyst, looks smooth and round and has a clearly defined edge. Breast cancer, in contrast, often has an irregular outline with finger-like extensions. Many mammograms show nontransparent white specks. These are calcium deposits known as **calcifications.**

► **Macrocalcifications** are coarse calcium deposits. They are usually found in women over age 50 and are often seen in both breasts. Macrocalcifications are most likely due to aging, old injuries, or inflammations, and they are typically associated with benign conditions.

► **Microcalcifications** are tiny flecks of calcium found in an area of rapidly dividing cells. Clusters of numerous microcalcifications in one area can be a sign of a very early, **noninvasive** form of breast cancer called ductal **carcinoma in situ.** About half of the

ASSURING HIGH-QUALITY MAMMOGRAPHY

To make sure that all women have access to high-quality mammography, a Federal law—the Mammography Quality Standards Act—now requires all mammography facilities to be certified by the Food and Drug Administration (FDA). Each facility must demonstrate that it meets Federal standards for equipment, personnel, and practices.

The FDA standards, supplemented by guidelines issued by the Agency for Health Care Policy and Research (part of the U.S. Public Health Service), are similar to voluntary accreditation standards set by the American College of Radiology (ACR) in the 1980s. Equipment must be capable of producing high-quality mammograms with the lowest possible amount of radiation exposure. Furthermore, it must be checked regularly by a radiological physicist and adjusted as necessary to be sure that its measurements and doses are correct.

Doctors and other staff members must be specially trained to perform and interpret breast x-rays. The technologists who take mammograms are certified by the American Registry of Radiological Technologists or licensed by the state; the doctors who read mammograms should be board-certified radiologists who have taken special courses in mammography.

The regulations also specify that mammographic facilities must perform mammography regularly and frequently, maintain quality assurance programs, and ensure proper reporting of test results.

cancers found by mammography are detected as clusters of microcalcifications.

The radiologist will report the findings from your mammogram directly to you or to your doctor, who will contact you with the results. If you need further tests or examinations, your doctor will let you know. ***If you don't get a report, you should call and ask for the results. Don't simply assume that the mammogram is normal if you do not receive the results.***

Your mammograms constitute an irreplaceable part of your health history. Being able to compare earlier mammograms with new x-rays helps your doctor evaluate areas that look suspicious. If you move, ask your radiologist for your films and hand-carry them to your new physician, so they can be kept with your file.

Mammography and Breast Implants

A woman who has had breast implants should continue to have mammograms. (A woman who has had an implant following breast cancer surgery should ask her doctor whether a mammogram is still necessary.) However, the woman should inform the technologist and radiologist beforehand and make sure they are experienced in x-raying patients with breast implants.

Because silicone implants are not transparent on x-ray, they can block a clear view of the tissues behind them. This is especially true if the implant has been placed in front of, rather than beneath, the chest muscles.

Experienced technologists and radiologists know how to take special care when compressing the breasts to avoid the danger of rupturing the implant. They can also use special techniques to detect abnormalities, sliding the implant backward against the chest wall, and pulling the breast tissue over and in front of it. Interpreting the mammogram can also be difficult, especially if scar tissue has formed around the implant or if silicone has leaked into nearby breast tissues.

Choosing a Mammography Facility

Many places offer high-quality mammography—breast clinics, radiology departments of hospitals, mobile vans, private radiology practices, doctors' offices. Your doctor can arrange for a

mammogram for you, or you can schedule the appointment yourself.

When calling to make an appointment, you should ask if the facility has been certified by the Food and Drug Administration. (See *Assuring High-Quality Mammography,* page 8.) Staff of the facility are required to post the FDA certificate in a prominent place; if you don't see it, you should ask again about certification.

In addition to quality, another important consideration is cost. Most screening mammograms cost between $50 and $150. Most states now have laws requiring health insurance companies to reimburse all or part of the cost of screening mammograms; check with your insurance company. For women ages 65 and older, the Federal Medicare program pays some of the cost for screening mammography once every 2 years.

Some health service agencies and some employers provide mammograms free or at low cost. Low cost does not mean low quality, however. A large government survey found that some of the facilities charging the lowest fees (often because they serve large numbers of women) were among the best in terms of complying with high-quality standards.

Your doctor, local health department, clinic, or chapter of the American Cancer Society, as well as the Cancer Information Service at 1-800-4-CANCER (1-800-422-6237), may be able to direct you to low-cost programs in your area.

Getting a Regular Mammogram

More women are getting mammograms. The percent of women ages 50 and older who had a mammogram in the past 2 years more than doubled between 1987 and 1993, from 27 to 60 percent. And women with health coverage are more likely to use mammography. However, many women still do not continue to get mammograms and clinical breast exams at regular intervals. Sadly, the women least likely to have regular exams include those at highest risk, women ages 60 and older.

The reason women most frequently give for having—or not having—a mammogram is whether or not the doctor suggested it. Although surveys show that more physicians are routinely advising mammography, some physicians fail to do so—some because they

forget, some because they assume that another doctor has done so. If your doctor doesn't suggest mammography, it will be up to you to raise the issue.

Other Techniques for Detecting Breast Cancer

Currently, mammography and breast exams by the doctor or nurse are the most common and useful techniques for finding breast cancer early. Other methods such as ultrasound may be helpful in narrowing the diagnosis for women who have suspicious breast changes. However, no other procedure is yet proven to be effective for screening women with no symptoms; thus, most alternative methods of breast cancer detection are used primarily in research programs.

▶ **Ultrasound** works by sending high-frequency sound waves into the breast. The pattern of echoes from these sound waves is converted into an image (**sonogram**) of the breast's interior. Ultrasound, which is painless and harmless, is especially good in distinguishing between tumors that are solid and cysts, which are filled with fluid. Sonograms of the breast can also be helpful in evaluating some lumps that can be felt but are hard to see on a mammogram, especially in the dense breasts of young women. Unlike mammography, ultrasound cannot detect the microcalcifications that sometimes indicate cancer, nor does it pick up small tumors.

▶ **Computed tomography, or CT scanning,** uses a computer to organize the information from multiple x-ray views and construct a cross-sectional image of the body. CT is sometimes helpful in locating breast lesions that are difficult to pinpoint with mammography or ultrasound—for instance, a tumor that is so close to the chest wall that it shows up in only one mammographic view.

▶ Several even newer techniques for imaging the breast are in the research stage. These include **Magnetic resonance imaging**, or **MRI,** which relies on magnetic fields and radio waves to produce a likeness of body tissues, and **Positron emission tomography (PET scanning),** which can identify tissues that are abnormally active. **Laser beam scanning** shines a powerful laser beam through the breast while a special camera on the far side of the breast records the image.

▶ Researchers are also striving to make mammography more sensitive and more accurate. **Digital mammography** is a technique for recording x-ray images in computer code, allowing the information to be manipulated in ways that enhance subtle, but potentially significant, variations. **Computer-aided diagnosis,** or CAD, uses special computer programs to scan mammographic images and alert radiologists to areas that look suspicious.

Future Techniques for Detecting Breast Cancer

Genes related to breast cancer are complex, making the development of a reliable blood test for breast cancer screening in most women a future goal, not a present technique. Today, scientists at NCI and elsewhere believe that gene tests for breast and other gene mutations require careful study to establish them for routine use. Many other genes may be involved in breast cancer, and much more needs to be learned about the accuracy of molecular tests and the risk carried by particular gene mutations. Special genetic counseling programs are available to inform women about the ramifications of test results.

Recently, it has become possible to identify **genetic changes** that predispose women to breast cancer. This type of molecular diagnostic test is made possible because scientists have precisely located the BRCA1 and BRCA2 genes, which normally work to control cell growth in breast tissue. When certain genetic changes called mutations occur in these genes, a person may be more susceptible to developing breast cancer.

BRCA1 mutation testing has primarily been done in certain families whose members are inclined to develop breast cancer at an early age due to an inherited change. It is hoped that in the future, these genetic tests will enable scientists to better advise women in high-risk families. Accurate results may enable early aggressive treatment when appropriate, and may reassure those women found to be at no greater risk for breast cancer than women at large.

NCI is supporting research on the development of genetic tests and on genetic counseling as well.

Clinical Breast Exam

Most professional organizations feel that it is important to have periodic breast exams by a doctor or nurse along with getting regular screening mammograms. You may find it convenient to schedule a breast exam during your routine physical.

The examiner will look at your breasts while you are sitting and while you are lying down. You may be asked to raise your arms over your head or let them hang by your sides, or to press your hands against your hips. The examiner checks your breasts carefully for changes in the skin such as dimpling, scaling, or puckering; or any discharge from the nipples; or any difference in appearance between the two breasts, including differences in size or shape. The next step is **palpation:** Using the pads of the fingers to feel for lumps, the examiner will systematically inspect the entire breast, the underarm, and the collarbone area, first on one side, then on the other.

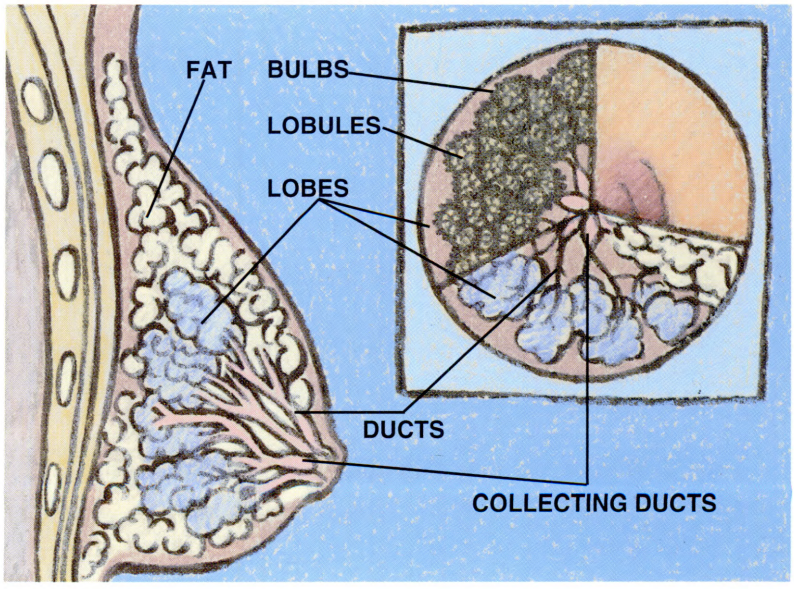
A lump is generally the size of a pea before a skilled examiner can detect it. Lumps that are soft, round, and smooth tend not to be cancerous. An irregular, hard lump that feels firmly anchored within the breast tissue is more likely to be a cancer. However, these are general observations, not hard and fast rules. **The only sure way to know if a solid lump is cancer is to have some tissue removed and examined under the microscope in a procedure called biopsy.**

A breast exam by a doctor or nurse can find some cancers missed by mammography, even very small ones. In addition to the skill and carefulness of the examiner, the success of a clinical breast examination can be influenced by your monthly cycle and by the size of your breast, as well as by the size and location of the lump itself. Lumps are harder to find in a large breast.

About Breast Lumps and Other Breast Changes

Over her lifetime, a woman can encounter a broad variety of benign breast conditions. These include normal changes that occur during the menstrual cycle as well as several types of benign lumps. What they have in common is that they are *not* cancer. Even among breast lumps that warrant a biopsy, some 80 percent prove to be benign.

Each breast has 15 to 20 sections, called **lobes,** each with many smaller **lobules**. The lobules end in dozens of tiny **bulbs** that can produce milk. Lobes, lobules, and bulbs are all linked by thin tubes called **ducts.** These ducts lead to the nipple, which is centered in a dark area of skin called the **areola.** The spaces between the lobules and ducts are filled with fat. There are no muscles in the breast, but muscles lie under each breast and cover the ribs.



The breast's milk-producing system consists of lobes, lobules, and bulbs all linked by thin tubes called ducts.

These normal features can sometimes make the breasts feel lumpy, especially in women who are thin or who have small breasts.

In addition, from the time a girl begins to menstruate, her breasts undergo regular changes each month. Many doctors believe that nearly all breasts develop some lasting changes, beginning when the woman is about 30 years old. Eventually, about half of all women will experience symptoms such as lumps, pain, or nipple discharge. Generally these disappear with menopause.

Some studies show that the chances of developing benign breast changes are higher for a woman who has never had children, has irregular menstrual cycles, or has a family history of breast cancer. Benign breast conditions are less common among women who take birth control pills or who are overweight. Because they generally involve the glandular tissues of the breast, benign breast conditions are more of a problem for women of child-bearing age, who have more glandular breasts.

Types of Benign Breast Changes

Common benign breast changes fall into several broad categories. These include generalized breast changes, solitary lumps, nipple discharge, and infections and/or inflammation.

▶ **Generalized breast lumpiness** is known by several names, including fibrocystic changes and benign breast disease. Such lumpiness, which is sometimes described as "ropy" or "granular," can often be felt in the area around the nipple and areola and in the upper outer part of the breast. Such lumpiness may become more obvious as a woman approaches middle age and the milk-producing glandular tissue of her breasts increasingly gives way to soft, fatty tissue. Unless she is taking replacement hormones, this type of lumpiness generally disappears for good after menopause.

▶ The **menstrual cycle** also brings change. Many women experience swelling, tenderness, and pain before and sometimes during their periods. At the same time, one or more lumps or a feeling of increased lumpiness may develop, because of extra fluid collecting in the breast tissue. These lumps normally go away by the end of the period.

▶ During pregnancy, the milk-producing glands become swollen and the breasts may feel lumpier than usual. It can be difficult to examine your breasts when you are pregnant, but you should continue to do so; although very uncommon, breast cancer has been diagnosed during pregnancy. If you have a question about the way your breasts feel, talk to your doctor.

▶ Benign breast conditions also include several types of distinct, solitary lumps. Such lumps, which can appear at any time, may be large or small, soft or rubbery, fluid-filled or solid.

▶ **Cysts** are fluid-filled sacs. They occur most often in women 35 to 50 years of age, and they often enlarge and become tender and painful just before the menstrual period. They are usually found in both breasts. Some cysts are so small they cannot be felt; rarely, cysts may be several inches across. Cysts are usually treated by observation or by fine-needle aspiration. They show up clearly on ultrasound. (See *Aspirating a Cyst,* page 21.)

▶ **Fibroadenomas** are solid and round benign tumors that are made up of both structural (fibro) and glandular (adenoma) tissues. Usually these lumps are painless, and usually they are found by the woman herself. They feel rubbery and can easily be moved around. Fibroadenomas are the most common type of tumors in women in their late teens and early twenties, and they occur twice as often in African-American women as in other American women.

Fibroadenomas have a typically benign appearance on mammography (smooth, round masses with a clearly defined edge), and they can sometimes be diagnosed with fine needle aspiration. Although fibroadenomas do not become malignant, they can enlarge with pregnancy and breast-feeding. Most surgeons believe that it is a good idea to remove fibroadenomas to make sure they are benign.

▶ **Fat necrosis** is the name given to painless, round and firm lumps formed by damaged and disintegrating fatty tissues. This condition typically occurs in obese women with very large breasts. It often develops in response to a bruise or blow to the breast, even though the woman may not remember the specific injury. Sometimes the skin around the lumps looks red or bruised. Fat necrosis can easily be mistaken for cancer, so such lumps are removed in a surgical biopsy. (See *Biopsy*, page 21.)

▶ **Sclerosing adenosis** is a benign condition involving the excessive growth of tissues in the breast's lobules. It frequently causes breast pain. Usually the changes are microscopic, but adenosis can produce lumps, and it can show up on mammography, often as calcifications. Short of biopsy, adenosis can be difficult to distinguish from cancer. The usual approach is surgical biopsy, which furnishes both diagnosis and treatment.

Some benign breast conditions produce a **discharge from the nipple.** Since the breast is a gland, secretions from the nipple of a mature woman are not unusual, nor even necessarily a sign of disease. For example, small amounts of discharge commonly occur in women taking birth control pills or certain other medications, including sedatives and tranquilizers. If the discharge is being caused by a disease, the disease is more likely to be benign than cancerous.

Nipple discharges come in a variety of colors and textures. A milky discharge can be traced to many causes, including thyroid malfunction and oral contraceptives or other drugs. Women with generalized breast lumpiness may have a sticky discharge that is brown or green.

The doctor will take a sample of the discharge and send it to a laboratory to be analyzed. Benign sticky discharges are treated chiefly by keeping the nipple clean. A discharge caused by infection may require antibiotics.

▶ One of the most common sources of a bloody or sticky discharge is an **intraductal papilloma,** a small wartlike growth that projects into breast ducts near the nipple. Any slight bump or bruise in the area of the nipple can cause the papilloma to bleed. Single (solitary) intraductal papillomas usually affect women nearing menopause. If the discharge becomes bothersome, the diseased duct can be removed surgically without damaging the appearance of the breast. Multiple intraductal papillomas, in contrast, are more common in younger women. They often occur in both breasts and are more likely to be associated with a lump than with nipple discharge. Multiple intraductal papillomas, or any papillomas associated with a lump, need to be removed.

Some benign breast conditions are characterized by **infections and/or inflammation.**

▶ **Mastitis** (sometimes called "postpartum mastitis") is an infection most often seen in women who are breast-feeding. A duct may become blocked, allowing milk to pool, causing inflammation and setting the stage for infection by bacteria. The breast appears red and feels warm, tender, and lumpy.

In its earlier stages, mastitis can be cured by antibiotics. If a pus containing **abscess** forms, it will need to be drained or surgically removed.

▶ **Mammary duct ectasia** is a disease of women nearing menopause. Ducts beneath the nipple become inflamed and can become clogged. Mammary duct ectasia can become painful, and it can produce a thick and sticky discharge that is grey to green in color. Treatment consists of warm compresses, antibiotics, and, if necessary, surgery to remove the duct.

A word of caution: If you find a lump or other change in your breast, don't use this booklet to try to diagnose it yourself. There is no substitute for a doctor's evaluation.

Benign Breast Conditions and the Risk of Breast Cancer

Most benign breast changes do not increase a woman's risk of getting cancer. Recent studies show that only certain very specific types of microscopic changes put a woman at higher risk. These changes feature excessive cell growth, or **hyperplasia.**

Approximately 70 percent of the women who have a biopsy showing a benign condition have no evidence of hyperplasia. **These women are at no increased risk of breast cancer.**

About 25 percent of the benign breast biopsies show signs of hyperplasia, including conditions such as intraductal papilloma and sclerosing adenosis. Hyperplasia *slightly* increases the risk of developing breast cancer.

The remaining 5 percent of benign breast biopsies reveal both excessive cell growth—hyperplasia—and cells that are abnormal—atypia. A diagnosis of **atypical hyperplasia,** as it is called, *moderately* increases breast cancer risk.

When You Find a Lump

If you discover a lump in one breast, examine the other breast. If both breasts feel the same, the lumpiness is probably normal. You should, however, mention it to your doctor at your next visit.

But if the lump is something new or unusual and does not go away after your menstrual period, it is time to call your doctor. The same is true if you discover a discharge from the nipple or skin changes such as dimpling or puckering. If you do not have a doctor of your own, your local medical society may be able to help you find a doctor or clinic in your area.

You should not let fear delay you. It's natural to be concerned if you find a lump in your breast. But it's important to remember that 80 percent of all breast lumps are benign, which means no cancer is present. The sooner any problem is diagnosed, the sooner you can have it treated.

Clinical Evaluation

No matter how your breast lump was discovered, the doctor will want to begin with your "history": What symptoms do you have and how long have you had them? What is your age, menstrual status, general health? Are you pregnant? Are you taking any medications? How many children do you have? Do you have any relatives with benign breast conditions or breast cancer? Have you previously been diagnosed with benign breast changes?

The doctor will then carefully examine your breasts and will probably schedule you for a diagnostic mammogram. If you have a symptom suggestive of breast cancer, you should not hesitate to have a mammogram if your doctor recommends it.

Mammography for diagnosis, as distinct from mammography for screening women who have no symptoms, is designed to obtain as much information as possible about an existing change. This may be either a lump that can be felt or an abnormality discovered on a screening mammogram. Diagnostic mammography may include additional views or use special techniques to magnify a suspicious area or to eliminate shadows produced by overlapping layers of

normal breast tissue. The doctor will want to compare the diagnostic mammograms with any previous mammograms. If the lump appears to be a cyst, your doctor may ask you to have a sonogram (ultrasound study).

Aspirating a Cyst

When a cyst is suspected, some doctors proceed directly with **aspiration.** This procedure, which uses a very thin needle and a syringe, takes only a few minutes and can be done in the doctor's office. The procedure is not usually very uncomfortable, since most of the nerves in the breast are in the skin.

Holding the lump steady, the doctor inserts the needle and attempts to draw out any fluid. If the lump is indeed a cyst, removing the fluid will cause the cyst to collapse and the lump to disappear. Unless the cyst reappears in the next week or two, no other treatment is needed. If the cyst reappears at a later date, it can simply be drained again.

If the lump turns out to be solid, it may be possible to use the needle to withdraw a clump of cells, which can then be sent to a laboratory for further testing. (Cysts are so rarely associated with cancer that the fluid removed from a cyst is not usually tested unless it is bloody, or the woman is older than 55 years of age.)

Biopsy

The only certain way to learn whether a breast lump or mammographic abnormality is cancerous is by having a **biopsy,** a procedure in which tissue is removed by a surgeon or other specialist and examined under a microscope by a **pathologist.** The pathologist is a physician who specializes in identifying tissue changes that are characteristic of disease, including cancer.

Tissue samples for biopsy can be obtained either by surgery or needle. The doctor's choice of biopsy technique depends on such things as the nature and location of the lump as well as the woman's general health.

Surgical biopsies can be either excisional or incisional.

▶ An **excisional biopsy** removes the lump or the suspicious area in its entirety. Excision is currently the standard procedure for biopsying lumps that are smaller than an inch or so in diameter. In effect it is similar to a "lumpectomy," surgery to remove the lump and a margin of surrounding tissue. Lumpectomy is usually used in combination with radiotherapy as the basic treatment for early breast cancer.

An excisional biopsy is typically performed in the outpatient department of a hospital. A local **anesthetic** is injected into the woman's breast. Sometimes, she is given a tranquilizer before the procedure. The surgeon makes an incision along the contour of the breast and removes the lump along with a small margin of normal tissue. Because no skin is removed, the biopsy scar is usually small. The procedure typically takes less than an hour. After spending an hour or two in the recovery room, the woman goes home the same day.

▶ An **incisional biopsy** removes only a portion of the tumor (by slicing into or incising it) for the pathologist to examine. Incisional biopsies are generally reserved for tumors that are larger. They too are usually performed under local anesthesia, with the woman going home the same day.

Whether or not a surgical biopsy will change the shape of your breast depends partly on the size of the lump and where it is located in the breast as well as how much of a "margin" of healthy tissue the surgeon decides to remove. You should talk with your doctor beforehand so you understand just how extensive the surgery will be and what the cosmetic result will be.

▶ **Needle biopsies** can be performed with either a very fine needle or a cutting needle large enough to remove a small nugget of tissue.

▶ **Fine-needle aspiration,** as noted above, uses a fine-gauge needle and syringe, either to remove fluid from a cyst or clusters of cells from a solid mass. Accurate fine-needle aspiration biopsy of a solid mass takes great skill, gained through experience with numerous cases.

▶ **Core needle biopsy** uses a somewhat larger needle with a special cutting edge. The needle is inserted, under local anesthesia, through a small incision in the skin, and a small core of tissue is removed. This technique may not work well for lumps that are very hard or very small. Core needle biopsy may cause some bruising, but rarely leaves an external scar, and the procedure is over in a matter of minutes.

At some institutions with extensive experience, aspiration biopsy is considered as reliable as surgical biopsy, trusted to confirm the **malignancy** of a clinically suspicious mass or, alternatively, to support a benign diagnosis for a breast lump that appears noncancerous. Should the needle biopsy results be uncertain, the diagnosis is pursued with a surgical biopsy. At some institutions, doctors prefer to verify all aspiration biopsy results with a surgical biopsy before proceeding with treatment.

▶ **Localization biopsy** (also known as needle localization) is a procedure that uses mammography to locate and biopsy breast abnormalities that can be seen on a mammogram but cannot be felt (nonpalpable abnormalities). Localization can be used in conjunction with surgical biopsy, fine needle aspiration, or core needle biopsy.

For a surgical biopsy, the radiologist locates the abnormality on a mammogram (or a sonogram) just prior to surgery. Using the mammogram as a guide, the radiologist inserts a fine needle or wire so the tip rests in the suspect area—typically, an area of microcalcifications. The needle is anchored with a gauze bandage, and a second mammogram is taken to confirm that the needle is on target.

The woman, along with her mammograms, goes to the operating room, where the surgeon locates and cuts out the needle-targeted area. The more precisely the needle is placed, the less tissue needs to be removed.

Sometimes the surgeon will be able to feel the lump during surgery. In other cases, especially where the mammogram showed only microcalcifications, the mass can be neither seen nor felt. To make sure the surgical specimen in fact contains the abnormality, it is x-rayed on the spot. If this **specimen x-ray** fails to show the mass or the calcifications, the surgeon is able to remove additional tissue.

▶ **Stereotactic localization biopsy** is a newer approach that relies on a three-dimensional x-ray to guide the needle biopsy of a nonpalpable mass. With one type of equipment, the patient lies face down on an examining table with a hole in it that allows the breast to hang through; the x-ray machine and the maneuverable needle "gun" are set up underneath. Alternatively, specialized stereotactic equipment can be attached to a standard mammography machine.

The breast is x-rayed from two different angles and a computer plots the exact position of the suspicious area. (Because only a small area of the breast is exposed to the radiation, the doses are similar to those from standard mammography.) Once the target is clearly identified, the radiologist positions the gun and advances the biopsy needle into the lesion.

Tissue Studies

The cells or tissue removed through needle or surgical biopsy are promptly sent (along with the x-ray of the specimen, if one was made) to the pathology laboratory. If the excised lump is large enough, the pathologist can take a preliminary look by quick-freezing a small portion of the tissue sample, making it hard enough to slice into razor-thin sections that can be examined under the microscope. A **"frozen section"** provides an immediate if provisional diagnosis, and the surgeon may be able to give you the result before you go home.

A frozen section is not 100 percent guaranteed, however. A more thorough assessment will take several days longer, while the pathologist processes **"permanent sections"** of tissue that can be examined in greater detail.

When the biopsy specimen is small—as is often the case when the abnormality consists of mammographic calcifications only—many doctors prefer to forego a frozen section so the tiny specimen can be analyzed in its entirety.

The pathologist looks for abnormal cell shapes and unusual growth patterns. In many cases the diagnosis will be clear-cut. However, the distinctions between benign and cancerous can be subtle, and even experts don't always agree. When in doubt, pathologists readily consult their colleagues. If there is any question

about the results of your biopsy, you will want to make sure your slides have been reviewed by more than one pathologist.

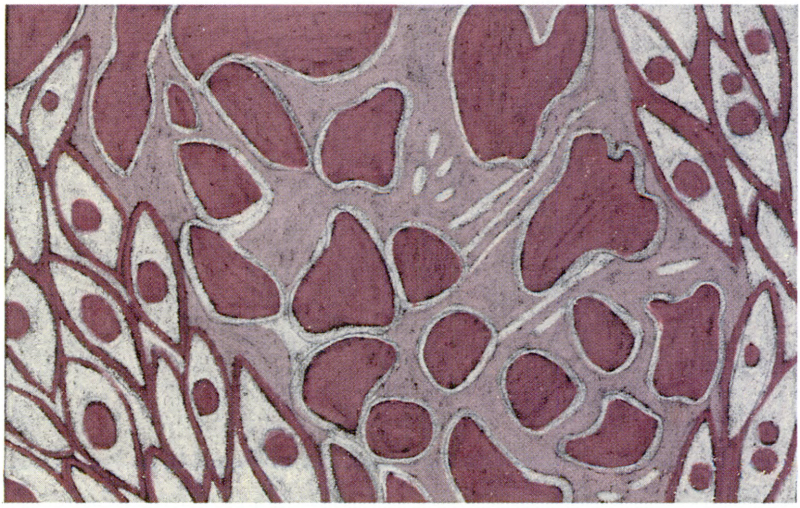
Deciding To Biopsy

Not every lump or mammographic change merits a biopsy. Nearly all mammographic masses that look smooth and clearly outlined, for instance, are benign. Your physician needs to thoughtfully weigh the findings from your physical examination and mammogram along with your background and your medical history in forming her or his recommendation.

In general, physicians feel it is wise to biopsy any distinct and persistent lump.

Although benign lumps rarely, if ever, turn into cancer, cancerous lumps can develop near benign lumps and can be hidden on a mammogram. Even if you have had a benign lump removed in the past, you cannot be sure any new lump is also benign.

In some instances the doctor may suggest watching the suspicious area for a month or two. Because many lumps are caused by normal hormonal changes, this waiting period may provide additional information.



The pathologist examines the slide looking for changes in the breast cells that may be indicative of breast cancer.

Similarly, if the changes on your mammogram show all the hallmarks of benign disease, your doctor may advise waiting several months and then taking another mammogram, to be followed by additional mammograms over the next 3 years. If you choose this option, however, you must be strongly committed to regular followup.

If you feel uncomfortable about waiting, express your concerns to your doctor. You may also want to get a second opinion, perhaps from a breast specialist or surgeon. Many cities have breast clinics where you can get a second opinion.

Biopsy: One Step or Two

Not too many years ago, all women undergoing surgery for breast symptoms had a **"one-step" procedure:** If the surgical biopsy showed cancer, the surgeon proceeded immediately with mastectomy. The woman went into surgery not knowing if she had cancer, and woke up not knowing if her breasts were intact.

Today a woman facing biopsy has a broader range of options. In most cases, biopsy and diagnosis will be separated from any further treatment by an interval of several days or weeks. Such a **"two-step" procedure** does not adversely affect outcome, and it provides several benefits. It allows time for the tissue sample to be examined in detail and, if cancer is found, it gives the woman time to adjust to the diagnosis. She can review her treatment options, seek a second opinion, receive counseling, and arrange her schedule.

Some women nonetheless prefer a one-step procedure. They have decided beforehand that, if the surgical biopsy and frozen section show cancer, they want to go ahead with surgery, either mastectomy or breast-conserving surgery and axillary dissection (removal of the underarm lymph nodes). If, on the other hand, the lump is benign, the incision will be closed; the procedure will have taken less than an hour, and the woman may go home the same day or the next day.

A one-step procedure avoids the physical and psychological stress, as well as the costs in time and money, of two rounds of

surgery and anesthesia—a particularly important consideration for women who are ill or frail. Women who have clinical signs of cancer can find the wait between biopsy and surgery emotionally draining, and they may be relieved to have a one-step procedure to take care of the problem as quickly as possible.

No single solution is right for everyone. Each woman should consult with her doctors and her family, weigh the alternatives, and decide what approach is appropriate. Being involved in the decision-making process can give a woman a sense of control over her body and her life.

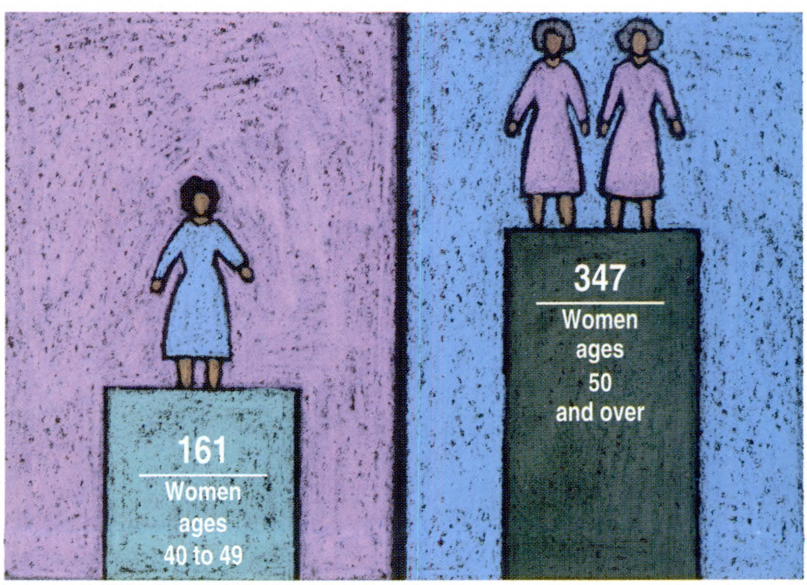
Factors That Increase the Risk of Breast Cancer

Simply being a woman and getting older puts you at risk for developing breast cancer. The older you are, the greater your chance of getting breast cancer. The breast cancer incidence rate, per 100,000 women per year, is 161 for women ages 40 to 49; for women older than age 50, it climbs to 347.

Risk is also increased for women who have a family history of breast cancer. The mothers, daughters, and sisters of women with breast cancer, especially if the relative developed this cancer at a young age, are two to five times more likely to develop breast cancer than women without a family history.

Average Breast Cancer Incidence
Per 100,000 Women: 1989-1993

Women ages 50 or older are more than twice as likely to develop breast cancer when compared to women ages 40 to 49.



Source: Surveillance, Epidemiology and End Results, 1989-1993

Recent research has identified gene mutations associated with inherited breast cancer. Such inherited cancers, however, account for only 5 to 10 percent of all breast cancer. Moreover, not every woman in high risk families who inherits one of these mutated genes will go on to develop breast cancer. With one of the breast cancer susceptibility genes, for instance, the risk of women in high risk families of developing disease by age 65 is about 80 percent, not 100 percent.

Women who themselves have already had cancer in one breast also run an increased risk of developing cancer in the other breast.

To a lesser extent, risk is influenced by various aspects of a woman's reproductive history. Risk is increased for women who began menstruating earlier (before age 12, compared to after 15), had their first child later (after age 30, compared to before 20) or were never pregnant, or completed menopause later (after age 55, compared to women who had their ovaries removed and went through "surgical menopause" at age 45).

Risk is also increased moderately for women who have the benign breast changes known as atypical hyperplasia.

Many aspects of the American lifestyle are suspected of possibly influencing the growing incidence of breast cancer. Current research is looking into the roles of obesity, hormones, and fat metabolism; the risks and benefits of postmenopausal hormone replacement therapy; the impact of taking oral contraceptives at an early age and for many years; alcohol use; and diet. Caffeine, on the other hand, appears to have no influence on the incidence of breast cancer.

It is important to keep in mind that these factors that increase cancer risk—**risk factors**—do not necessarily cause cancer; they are merely associations. Having one or more does not mean that you are certain or even likely to develop breast cancer. Even among women with a strong family history—both a mother and a sister or two sisters, one of whom developed breast cancer in both breasts or before menopause—three-fourths will not develop breast cancer.

Not having any of the known risk factors, on the other hand, does not mean that you are "safe." The majority of women who develop breast cancer do not have a family history of breast cancer or fall into any other special high-risk category.

Prevention Research

Many of the factors that influence your chances of developing breast cancer—your age, a family history of breast cancer, the age at which you began to menstruate—are beyond your control. Others, however, present opportunities for change, and several large research trials are looking at possibilities for "intervention."

The Breast Cancer Prevention Trial is a randomized study of **tamoxifen,** a drug that has been widely used in the treatment of women with breast cancer. Because tamoxifen, when taken for 5 years, has been found to markedly reduce the occurrence of new cancers in the opposite breast of women who have already had breast cancer, it is now being tried as a preventive in healthy women at increased risk of breast cancer either because they are age 60 or older or because they have combinations of other risk factors. (Tamoxifen also appears to offer protection against heart attacks and osteoporosis in postmenopausal women.)

"Nutrient **chemoprevention**" is being tested in Italy, where women who have already been treated for breast cancer are taking 4-HPR, a synthetic form of vitamin A, in hopes of preventing cancer from developing in the opposite breast. Other researchers are investigating the protective potential of several other vitamins, including C and E. Yet other scientists are checking out naturally occurring chemicals, called phytochemicals, found in common fruits, vegetables, and other edible plants, in hopes of finding cancer-fighting substances that can be extracted, purified, and added to our diets.

Diet itself is another target of prevention research. In the Women's Health Initiative, a project of the National Institutes of

Health, 70,000 women over age 50 are being enrolled in a series of clinical trials to measure the effectiveness of a low-fat diet (less than 20 percent of calories from fat) and calcium plus vitamin D supplements, along with **hormone replacement therapy**, in combatting heart disease and osteoporosis as well as cancer. Another large trial evaluating a low-fat diet in high-risk women is under way in Canada.

A much more drastic approach to breast cancer prevention is surgery to remove both breasts. Such a procedure, known as **prophylactic mastectomy**, is sometimes chosen by women with a very high risk for breast cancer—for instance, having a mother and one or more sisters with bilateral premenopausal breast cancer, plus a diagnosis of atypical hyperplasia and a history of several breast biopsies.

Unless a woman finds that anxiety is undermining the quality of her life, she is usually counseled not to choose this physically and psychologically draining surgery. The vast majority of breasts removed prophylactically show no signs of cancer. Moreover, since even an ordinary ("total") mastectomy can leave a small amount of breast tissue behind, it cannot guarantee the woman will remain cancer-free. The preferred approach for most high-risk women is careful surveillance with clinical breast exams and mammography once or twice a year.

If you are considering a prophylactic mastectomy, with or without subsequent breast reconstruction, you will want to get a second opinion, preferably from a breast specialist. There is seldom reason to rush your decision. Many doctors advise a woman to give herself several months to weigh the options.

If your risk for breast cancer is high, you might also consider talking with a genetic counselor about gene testing. Scientists have identified a breast cancer susceptibility mutation that is responsible for about 5 to 10 percent of all the cases of breast cancer.

Steps for Health

Whether your risk of breast cancer is low or high, there are some steps you can take to improve your chances of recovering fully if you get the disease.

▶ You can follow early detection practices. Ask your doctor when you should begin mammograms at regular intervals. Get regular breast exams by a doctor or nurse.

▶ If your risk is elevated, you can enroll in one of the prevention trials; for information, call the National Cancer Institute's Cancer Information Service at 1-800-4-CANCER.

▶ In making decisions about hormone-containing drugs, you can consult your doctor about your personal situation and carefully weigh any potential risks against the benefits. You can stay informed as new research findings become available.

▶ You can exercise and eat a balanced diet that provides a good variety of nutrients and plenty of fiber, limit dietary fat, and drink alcohol only in moderation. These are "good health" measures that make sense for everyone.

Questions To Ask Your Doctor

We hope that this booklet has answered many of your questions about breast changes and the early detection of breast cancer. However, no booklet can take the place of talking directly with your doctor. Take any questions you have to your doctor. If you don't understand the answer, ask her or him to explain further.

Many women find it helpful to write down their questions ahead of time. Here is a list of some of the most common questions that women have. You may have others. Write them down as you think of them, and take the list with you when you see your doctor.

*How often should I schedule appointments with you?

*How can I distinguish lumps from the normal parts of my breast?

*What kinds of lumps do I have?

*Is there anything in my background that indicates I should have mammograms more often than your usual recommendations?

*Do I need to have a mammogram? How often? Or if not, why not?

*How can I be sure that my mammogram is of good quality?

*How can I be sure that the interpretation of my mammogram is of high quality?

Glossary

Abscess: A pocket of pus that forms as the body's defenses attempt to wall off infection-causing germs.

Adenocarcinoma: A cancer that develops in gland-forming tissue. Most breast cancers are adenocarcinomas.

Anesthetics: Drugs or gases that produce complete or partial loss of feeling or sensation. Local anesthetics numb a specific (local) part of the body. General anesthetics produce a state of unconsciousness and eliminate pain sensation throughout the body.

Areola: The colored tissue that encircles the nipple.

Aspiration: Removal of fluid from a cyst or cells from a mass, using a needle and syringe.

Atypical hyperplasia: Cells that are both abnormal (atypical) and increased in number. Benign microscopic breast changes known as atypical hyperplasia moderately increase a woman's risk of developing breast cancer.

Benign: Not cancerous; cannot invade neighboring tissues or spread to other parts of the body.

Benign breast conditions: Noncancerous changes in the breast. Benign breast conditions can cause pain, lumpiness, nipple discharge, and other problems.

Biopsy: The removal of a sample of tissue or cells for examination under a microscope for purposes of diagnosis.

Calcifications: Small deposits of calcium in tissue, which are visible on mammograms.

Cancer: A general name for more than 100 diseases in which abnormal cells grow out of control. Cancer cells can invade and destroy healthy tissues, and they can spread through the bloodstream and the lymphatic system to other parts of the body.

Carcinoma: Cancer that begins in tissues lining or covering the surfaces (epithelial tissues) of organs, glands, or other body structures. Most cancers are carcinomas. See **Adenocarcinoma.**

Carcinoma in situ: Cancer that is confined to the cells where it began, and has not spread into surrounding tissues. See **Noninvasive cancer.**

Chemoprevention: The use of drugs or vitamins to prevent cancer in people who have precancerous conditions or a high risk of cancer, or to prevent the recurrence of cancer in people who have already been treated for it.

Clinical breast exam: A physical exam during which a doctor will carefully feel the breasts and underarm area, looking for lumps or other unusual changes.

Computed tomography (CT) scanning: An imaging technique that uses a computer to organize the information from multiple x-ray views and construct a cross-sectional image of areas inside the body.

Computer-aided diagnosis (CAD): The use of special computer programs to scan mammographic images for areas that look suspicious.

Core needle biopsy: The use of a small cutting needle to remove a core of tissue for microscopic examination.

Cyclic breast changes: Normal tissue changes that occur in response to the changing levels of female hormones during the menstrual cycle. Cyclic breast changes can produce swelling, tenderness, and pain.

Cyst: Fluid-filled sac. Breast cysts are benign.

Diagnostic mammography: The use of mammography to evaluate the breasts of a woman who has symptoms of disease such as a lump, or whose screening mammogram shows an abnormality.

Digital mammography: A technique for recording x-ray images in computer code, allowing the information to be manipulated in ways that enhance subtle, but potentially significant, variations.

Duct: A channel that carries body fluids. Breast ducts transport milk from the breast's lobules out to the nipple.

Estrogen: A female hormone. Estrogen is involved in breast development and may help some types of breast cancer to grow.

Excisional biopsy: The surgical removal (excision) of an abnormal area of tissue, usually along with a margin of healthy tissue, for microscopic examination. Excisional biopsy in the breast removes the entire lump.

Fat necrosis: Lumps of fatty material that form in response to a bruise or blow to the breast (or surgery or radiation therapy).

Fibroadenoma: Benign breast tumor made up of both structural (fibro) and glandular (adenoma) tissues.

Fibrocystic disease: See **Generalized breast lumpiness.**

Fine needle aspiration: The use of a slender needle to remove fluid from a cyst or clusters of cells from a solid lump.

Frozen section: A sliver of frozen biopsy tissue. A frozen section provides a quick preliminary diagnosis but is not 100 percent reliable.

Generalized breast lumpiness: Breast irregularities and lumpiness, commonplace and noncancerous. Sometimes called "fibrocystic disease" or "benign breast disease."

Genetic change: An alteration in a segment of DNA, which can disturb a gene's behavior and sometimes leads to disease.

Hormone replacement therapy: Hormone-containing medications taken to offset the symptoms and other effects of the hormone loss that accompanies menopause.

Hormones: Chemicals produced by various glands in the body, which produce specific effects on specific target organs and tissues.

Hyperplasia: Excessive growth of cells. Several types of benign breast conditions involve hyperplasia.

Incisional biopsy: The surgical removal of a portion of an abnormal area of tissue, by cutting into (incising) it, for microscopic examination.

Infection: Invasion of body tissues by microorganisms such as bacteria and viruses.

Inflammation: The body's protective response to injury (including infection). Inflammation is marked by heat, redness, swelling, pain, and loss of function.

Intraductal papilloma: A small wartlike growth that projects into a breast duct.

Invasive cancer: Cancer that spreads into and destroys nearby tissues.

Laser beam scanning: A method of optical imaging that uses sets of laser light sources and detectors located around a section of a breast.

Lobes, lobules, bulbs: Milk-producing tissues of the breast. Each of the breast's 15 to 20 lobes branches into smaller lobules, and each lobule ends in scores of tiny bulbs. Milk originates in the bulbs and is carried by ducts to the nipple.

Localization biopsy: The use of mammography to locate tissue containing an abnormality that can be detected only on mammograms, so it can be removed for microscopic examination.

Lymphatic system: The tissues and organs that produce, store, and transport cells that fight infection and disease.

Macrocalcifications: Coarse calcium deposits seen on mammograms, usually associated with benign breast conditions.

Malignant: Cancerous. Can invade surrounding tissues and spread to other parts of the body.

Mammary duct ectasia: A benign breast condition in which ducts beneath the nipple become dilated and sometimes inflamed, and which can cause pain and nipple discharge.

Mammogram: An x-ray of the breast.

Mastitis: Infection of the breast. Mastitis is most often seen in nursing mothers.

Menopause: The time when a woman's monthly menstrual periods cease. Menopause is sometimes called the "change of life."

Menstruation: The monthly discharge, during a woman's reproductive years, of blood and tissues from the uterus.

Metastasis: The spread of cancer, through the bloodstream or the lymphatic system, from one part of the body to another.

Microcalcifications: Tiny deposits of calcium in the breast, which can show up on a mammogram. Certain patterns of microcalcifications are sometimes a sign of breast cancer.

MRI (Magnetic resonance imaging): A technique that uses a powerful magnet linked to a computer to create detailed pictures of areas inside the body.

Needle biopsy: Use of a needle to extract cells or bits of tissue for microscopic examination.

Nipple discharge: Fluid coming from the nipple.

Noninvasive cancer: A growth made up of cells that are cancerous in appearance, but which has not spread into neighboring tissues. Noninvasive breast cancers are known as ductal carcinoma in situ and lobular carcinoma in situ.

Nonpalpable breast abnormalities: Changes in breast tissue that can be seen on mammograms but that cannot be felt.

Nonpalpable cancers: Cancers that can be seen on mammograms, but that cannot be felt.

One-step procedure: Biopsy and surgical treatment combined into a single operation.

Palpation: Use of the fingers to press body surfaces, so as to feel tissues and organs underneath. Palpating the breast for lumps is a cornerstone of physical breast examination.

Pathologist: A doctor who diagnoses disease by studying cells and tissues under a microscope.

PET (Positron emission tomography): A technique that uses signals emitted by radioactive tracers to construct images of the distribution of the tracers in the human body.

Permanent section: Biopsy tissue specially prepared and mounted on slides so that it can be examined under a microscope by a pathologist.

Prophylactic mastectomy: Surgery to remove a breast that is not known to contain breast cancer, for the purpose of eliminating cancer risk.

Rad: A unit of measure for radiation. It stands for radiation absorbed dose.

Radiation: Energy carried by waves or by streams of particles. Various forms of radiation can be used in low doses to diagnose disease and in high doses to treat disease. See **X-rays.**

Radiologist: A doctor with special training in the use of x-rays (and related technologies such as ultrasound) to image body tissues and to treat disease.

Recurrence: Reappearance of cancer at the same site (local recurrence), near the original site (regional recurrence), or in other areas of the body (metastasis).

Risk factors: Conditions or agents that increase a person's chances of getting cancer. Risk factors do not necessarily cause cancer; rather, they are indicators, statistically associated with an increase in risk.

Sclerosing adenosis: A benign breast disease that involves the excessive growth of tissues in the breast's lobules.

Screening: Looking for signs of disease such as cancer in people who are symptom-free.

Sonogram: The image produced by ultrasound.

Specimen x-ray: An x-ray of tissue that has been surgically removed (surgical specimen).

Stereotactic localization: A technique that employs three-dimensional x-ray to pinpoint a specific target area. It is used in conjunction with needle biopsy of nonpalpable breast abnormalities.

Surgical biopsies: See **Excisional biopsy** and **Incisional biopsy.**

Tamoxifen: A hormonally related drug that has been used to treat breast cancer and is being tested as a possible preventive.

Tumor: An abnormal growth of tissue. Tumors may be either benign or cancerous.

Two-step procedure: Biopsy and treatment done in two stages, usually a week or two apart.

Ultrasound: The use of sound waves to produce images of body tissues.

X-rays: A high-energy form of radiation. X-rays form an image of body structures by traveling through the body and striking a sheet of film. Breast x-rays are called mammograms.

Resources

Information about cancer is available from the sources listed below. You may wish to check for additional information at your local library or bookstore and from support groups in your community. Another option may be to use your computer to access and search the Internet.

Cancer Information Service (CIS)

The Cancer Information Service, a program of the National Cancer Institute (NCI), is a nationwide telephone service for cancer patients and their families and friends, the public, and health care professionals. The staff can answer questions (in English or Spanish) and can send National Cancer Institute materials about cancer. They also know about support groups and other resources and services, including a list of FDA-certified mammography facilities in your area. One toll-free number, 1-800-4-CANCER (1-800-422-6237), connects callers with the office that serves their area.

PDQ

People who have cancer, their families, and doctors who care for cancer patients need up-to-date and accurate information about cancer treatment. To meet these needs, NCI developed PDQ. This computer database gives quick and easy access to state-of-the-art treatment information for both patients and doctors.

To use PDQ, doctors may use an office computer or the services of a medical library. By calling CIS at 1-800-4-CANCER, doctors and patients can get PDQ information and learn how to use this system.

American Cancer Society (ACS)

The American Cancer Society is a voluntary organization with local units all over the country. It supports research, conducts educational programs, and offers support groups and many other services to patients and their families. It provides free booklets. To obtain information about services and activities in local areas, call the Society's toll-free number, 1-800-ACS-2345 (1-800-227-2345), or the number listed under American Cancer Society in the white pages of the telephone book.

Attention: All Readers

Please tell us what you think of this booklet.

1. The booklet was: ☐ easy to understand ☐ hard to understand

2. The information was: ☐ too much ☐ too little ☐ just the right amount

3. I would: ☐ recommend the booklet to other women
☐ NOT recommend the booklet to other women

4. I got this booklet from:
☐ doctor
☐ nurse or other health professional
☐ booklet rack at doctor's office or hospital
☐ calling 1-800-4-CANCER (Cancer Information Service)
☐ National Cancer Institute
☐ American Cancer Society or ACS volunteer
☐ other support group
☐ family member or friend
☐ other (please explain _____)
☐ Internet

5. Did this booklet...

a) cover information that you needed?	☐ yes	☐ no
b) help you understand breast changes better?	☐ yes	☐ no
c) help you make decisions about your health?	☐ yes	☐ no
d) help you in talking with your doctor?	☐ yes	☐ no
e) help you in dealing with your feelings about breast cancer?	☐ yes	☐ no

6. What is your age? _____

7. How far did you go in school?
☐ 8th grade or less
☐ some high school
☐ high school graduate
☐ some college
☐ college graduate
☐ graduate level education

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